NOVEMBER 1, 1881.

The President, Dr. RUSCHENBERGER, in the chair.

Thirty-four persons present.

Color in Autumn Leaves.—Mr. THOMAS MEEHAN referred to an excursion to the Salt Marshes of New Jersey, organized by a member of the Academy, Mr. Isaac C. Martindale, and generously seconded by the Camden and Atlantic Railroad Company, which furnished a special train of twelve cars for the company, with the privilege of stopping along the road at interesting botanical points. This gave unusual opportunity to examine the vegetation of the Salt Marshes, which, at this season of the year presented a scene of colored beauty unequaled perhaps in the whole world.

Mr. Meehan remarked that the vegetation which for the most part made up this flora, was either precisely the same as those which entered into the flora of similar localities in western Europe, or else of species so closely allied that only critical examination would show the distinction. The plant which gave the greatest brilliancy, chiefly on account of its numerical proportions, was *Salicornia herbacea*, the same plant which abounds along European shores. To the rich rosy red of this species *Salicornia mucronata* (of Bigelow, *S. Virginica* of most authors) added a rosy brown. Although this species is American there are forms of *S. herbacea* on the English coast, which approach it. The third species is *S. ambigua* of Michaux, a perennial species, and the analogue of the British *S. radicans*. This one never changes its bright green color till severe frost destroys it. The lively green very much enlivens the brilliancy of the orange, red and brown in the other marsh plants. The species precisely the same with those of England which gave color to the marshes besides these Salicornias were *Salsola Kali*, *Suæda maritima*, *Atriplex patula*, *Polygonum maritinum*, *Spartina stricta*, *Spartina juncea*, and *Ammophila arenaria*—the three last grasses which add much by their light browns to the richness of the whole. *Statice Limonium*, by its faded blue-gray tint, gave a peculiar element to the color. *Aster flexuosus*, closely related to *Aster Tripolium* of European marshes furnished a tint of purple-green. So far as could be observed of the many other species of plants which might be collected, these were the only ones giving character to the beautifully colored picture the marshes presented at this time.

The most interesting inquiry here presents itself—Why should plants common in the main to both continents, color so much more brightly in America than in Europe? We are reminded that what we see here in these marsh plants, does not hold good with close allies in other species. Among trees and shrubs there are some peculiar to each country, but closely allied, in which all

the American allies color, while the European rarely do. He named on the American side, *Betula populifolia*, *Fraxinus sambucifolia*, *Quercus alba*, *Cratægus cordata*, *Ulmus Americana*, *Alnus serrulata*, *Castanea Americana*, as against *Betula alba*, *Fraxinus excelsior*, *Quercus Robur*, *Cratægus oxyacantha*, *Ulmus campestris*, *Alnus glutinosa* and *Castanea vesca*. The whole American line had autumn coloring, of which the parallel European line was wholly destitute. These trees did not lose this characteristic by removal to the other continent. In America there were many of the European species five or ten generations from seed, and yet these last generations showed no more disposition to embrace the color characteristics of their American cousins, than did the first progenitor brought from abroad. We were so accustomed to associate our bright clear autumn skies with the color of our autumn foliage, that facts like these stagger us. Why should several generations of these European trees resist our climatal influences? But we have to remember that the coloring of fruits and foliage is not wholly the result of chemical power; what for want of a better name we know as vital power, claims a share.

Some apples have color on the sunny side, while the rosy cheek never appears on those of the same variety hidden by the foliage, and in these cases it is self-evident sunlight is a cause of color. Yet if we pluck such a variety from the tree, and place it in the sunlight, it will not color, so that we see here that there must be a connection with the living principle in the tree to enable the solar rays to act. Yet it requires a relaxation of the leaf's hold on life to bring out these colors. At any time during the summer, a maturing leaf on an American tree exhibits bright color—yet if a dying leaf half-colored, be plucked from the parent stem, there is no further change in the tint. Many leaves pass through grades, as green, light yellow, orange, brown, to scarlet. If they are gathered at yellow or brown, they remain yellow or brown, and so on all through these stages. Coloring therefore, could not wholly be considered chemically, for though decay, which we take to be a chemical action, is going on during the coloring stage, complete separation from the living tree at once stops the process.

If we consider these two facts together, and then some other known natural laws, we may form some reasonable hypothesis. There is, for instance, the principle of heredity, so ably insisted on by Mr. Darwin, in connection with all living things. A force once applied to an object, exerts an influence after the power has been removed. A wheel runs round, after the hand which turns it is taken away, and a change in a plant brought about by any circumstance will continue in connection with that plant some generations after the circumstances have ceased to exist. That this is so has been proved by Naudin with hybrid, or perhaps we should say crossed, lettuces, and in other ways. Supposing then

these closely allied species to have been originally of one parentage, how did the power in one case to change to bright color, or in the other to resist the tendency to color, originate? If by chemical power alone, it would occur at once, as a piece of white wood is at once browned by fire, but with the vital principle opposed to this chemically destructive principle, it would take more time to accomplish this change; and the change, once made, would again require more time to again alter the fixed condition. This is essentially the foundation of the law of heredity, and under its operation we could not reasonably look for a change in the coloring power of these European trees although light were an active agent, under even more than five or ten inherited generations.

At any rate we have in these salt-marsh plants the evidence that the plants of one country, in that country colorless, can be made to take the most brilliant colors when growing in ours. That these plants had one primary origin is certain, though the ancestry may have been separated by thousands of years. We know that plants introduced at once do not change at once—heredity forbids it. We may assume therefore that it was only after some generations on the American coast, under the influence perhaps of American light, that these European plants showed their American colors. We can see in these annual plants, with a new generation every year, the results in numerous generations, as we cannot see in the slower reproducing tree.

Mr. Meehan thought that though we could not say we had vet reached an unchallengeable solution of the cause of autumn color in American foliage, considerations like these brought us nearer to the end.

NOVEMBER 8.

The President, Dr. RUSCHENBERGER, in the chair.

Twenty-six persons present.

On Movements and Paralysis in the Leaves of Robinia.—Mr. THOMAS MEEHAN said that an inquiry of Prof. Sargent for a trunk of *Robinia viscosa* for the National Forestry Census, had led him to look closely into the history of *Robinia* in general, with some interesting results.

Though our text-books gave "Virginia and Southwards" as the native location of the tree, no one seems to have collected it of late years. Indeed herbarium specimens generally seemed to be from cultivated plants, and he could find nowhere direct evidence that it had ever been found wild by any botanist since its original discovery by Wm. Bartram, as we learn from his "Travels," and Michaux, as recorded by Ventenat in his "Plants of the Garden of Cels," towards the end of the last century. In